Claim Amendments

1. (currently amended) A method, a sensor array that employs a parameter to induce a time-varying phase angle φ on an optical signal that comprises a phase generated carrier, the method comprising ~~the step~~ steps of:

calculating a quadrature term Q through employment of one or more of a plurality of samples that are based on the optical signal;

calculating a peak value Q_p of the quadrature term Q;

calculating an in-phase term I through employment of one or more of the plurality of samples that are based on the optical signal;

calculating a peak value I_p of the in-phase term I:

$I_p(M,\beta) = 2 \cdot B \cdot \left(\cos(M \cdot \sin\beta) - \cos\left(M \cdot \sin\left(\pi/2 + \beta\right)\right)\right)$, wherein M is a modulation depth and β is a demodulation phase offset of the phase generated carrier;

calculating an operating point that comprises the modulation depth M and the demodulation phase offset β of the phase generated carrier through employment of the peak value I_p of the in-phase term I and the peak value Q_p of the quadrature term Q; and

calculating the phase angle φ through employment of the quadrature term Q and the in-phase term I~~only four samples~~, wherein ~~all the four samples~~ the quadrature term Q and the in-phase term I are based on the optical signal.

2. (currently amended) The method of claim 1, wherein the step of calculating the phase angle φ through employment of ~~only the four samples~~ the in-phase term I and the quadrature term Q comprises the ~~steps~~ step of:

~~calculating an in-phase term I through employment of one or more of the four samples;~~

~~calculating a quadrature term Q through employment of one or more of the four samples; and~~

calculating the phase angle φ through employment of the in-phase term I and the quadrature term Q at the operating point.

3. (currently amended) The method of claim ~~2~~ 1, ~~further comprising the steps of~~ wherein the step of calculating the phase angle φ through employment of the in-phase term I and the quadrature term Q comprises the step of:

~~calculating a peak value I_p of the in-phase term I;~~

~~calculating a peak value Q_p of the quadrature term Q; and~~

~~calculating an operating point that comprises a modulation depth M and a demodulation phase offset β of the phase generated carrier through employment of the peak value I_p of the in-phase term I and the peak value Q_p of the quadrature term Q~~

calculating the phase angle φ = arctangent (Q / I).

4. (currently amended) The method of claim 1, wherein the phase generated carrier comprises a period T_{pgc}, the method further comprising the step of:

sampling an output signal from the sensor array to obtain the ~~four~~ plurality of samples from a same instance of the period T_{pgc}.

5. (currently amended) The method of claim ~~4~~ 7, wherein the step of calculating the quadrature term Q through employment of one or more of the plurality of samples that are based on the optical signal ~~phase angle φ through employment of only four samples, the samples based on the optical signal~~ comprises the ~~steps~~ step of:

~~calculating an in-phase term I through employment of one or more of the four samples;~~

calculating ~~a~~ the quadrature term Q: ~~through employment of one or more of the four samples; and~~

$Q = -(S_0 - S_2);$

wherein the step of calculating the peak value Q_p of the quadrature term Q comprises the step of:

calculating the ~~phase angle φ through employment of the in-phase term I and~~ peak value Q_p of the quadrature term Q:

$$Q_p(M, \beta) = 2 \cdot B \cdot \sin(M \cdot \sin\beta).$$

6. (currently amended) The method of claim ~~5~~ 7, ~~further comprising the steps of~~ wherein the step of calculating the quadrature term Q through employment of one or more of the plurality of samples that are based on the optical signal comprises the step of:

calculating the quadrature term Q:

$Q = -2 * (S_0 - S_2);$

~~calculating a peak value I_p of the in phase term I;~~

wherein the step of calculating the peak value Q_p of the quadrature term Q comprises the step of:

calculating ~~a~~ the peak value Q_p of the quadrature term Q:

$$Q_p(M, \beta) = 4 \cdot B \cdot \sin(M \cdot \sin \beta)$$

~~; and~~

~~calculating an operating point that comprises a modulation depth M and a demodulation phase offset β of the phase generated carrier through employment of the peak value I_p of the in-phase term I and the peak value Q_p of the quadrature term Q~~.

7. (currently amended) The method of claim ~~6~~ 4, wherein the ~~four~~ plurality of samples comprise samples S_0, S_1, S_2, and S_3, wherein the step of calculating the in-phase term I through employment of the one or more of the ~~four~~ plurality of samples comprises the step of:

calculating the in-phase term I:

$I = (S_0 + S_2) - (S_1 + S_3).$

8. (currently amended) ~~The~~ A method, a sensor array that employs a parameter to induce a time-varying phase angle φ on an optical signal that comprises a phase generated carrier, wherein the phase generated carrier comprises a period T_{pgc}, the method comprising the steps of:

calculating the phase angle φ through employment of a quadrature term Q and an in-phase term I, wherein the quadrature term Q and the in-phase term I are based on the optical signal;

wherein the phase generated carrier comprises a period T_{pgc}, the method further comprising the step of:

sampling an output signal from the sensor array to obtain the plurality of samples from a same instance of the period T_{pgc};

wherein the step of calculating the phase angle φ through employment of the quadrature term Q and the in-phase term I comprises the steps of:

calculating the in-phase term I through employment of one or more of the plurality of samples;

calculating a quadrature term Q through employment of one or more of the plurality of samples; and

calculating the phase angle φ through employment of the in-phase term I and the quadrature term Q;

further comprising the steps of:

calculating a peak value I_p of the in-phase term I;

calculating a peak value Q_p of the quadrature term Q; and

calculating an operating point that comprises a modulation depth M and a demodulation phase offset β of the phase generated carrier through employment of the peak value I_p of the in-phase term I and the peak value Q_p of the quadrature term Q;

wherein the plurality of samples comprise samples S_0, S_1, S_2, and S_3, wherein the step of calculating the in-phase term I through employment of the one or more of the plurality of samples comprises the step of:

calculating the in-phase term I:

$I = (S_0 + S_2) - (S_1 + S_3)$;

~~of claim 7,~~ wherein the step of calculating the peak value I_p of the in-phase term I comprises the step of:

calculating the peak value I_p of the in-phase term I:

$$I_p(M, \beta) = 2 \cdot B \cdot \left(\cos(M \cdot \sin\beta) - \cos\left(M \cdot \sin\left(\pi/_2 + \beta\right)\right)\right).$$

9. (currently amended) The method of claim 8, wherein the step of calculating the quadrature term Q through employment of the one or more of the ~~four~~ plurality of samples comprises the step of:

calculating the quadrature term Q:

$Q = -(S_0 - S_2)$.

10. (original) The method of claim 9, wherein the step of calculating the peak value Q_p of the quadrature term Q comprises the step of:

calculating the peak value Q_p of the quadrature term Q:

$$Q_p(M,\beta) = 2 \cdot B \cdot \sin(M \cdot \sin\beta).$$

11. (original) The method of claim 10, wherein the step of calculating the phase angle φ through employment of the in-phase term I and the quadrature term Q comprises the step of:

calculating the phase angle φ = arctangent(Q / I).

12. (currently amended) The method of claim 8, wherein the step of calculating the quadrature term Q through employment of the one or more of the ~~four~~ plurality of samples comprises the step of:

calculating the quadrature term Q:

$Q = -2 * (S_0 - S_2)$.

13. (original) The method of claim 12, wherein the step of calculating the peak value Q_p of the quadrature term Q comprises the step of:

calculating the peak value Q_p:

$$Q_p(M,\beta) = 4 \cdot B \cdot \sin(M \cdot \sin\beta).$$

14. (original) The method of claim 13, wherein the step of calculating the phase angle φ through employment of the in-phase term I and the quadrature term Q comprises the step of:

calculating the phase angle φ = arctangent(Q / I).

15. (currently amended) An apparatus, a sensor array that employs a parameter to induce a time-varying phase angle φ on an optical signal that comprises a phase generated carrier, the apparatus comprising:

a processor component;

wherein the processor component employs one or more of a plurality of samples that are based on the optical signal to calculate an in-phase term I;

wherein the processor component employs one or more of the plurality of samples to calculate a quadrature term Q;

wherein the processor component calculates a peak value I_p of the in-phase term I as

$$I_p(M,\beta) = 2 \cdot B \cdot \left(\cos(M \cdot \sin\beta) - \cos\left(M \cdot \sin\left(\pi/2 + \beta\right)\right)\right),$$ wherein M is a modulation depth and β is a demodulation phase offset of the phase generated carrier;

wherein the processor component calculates a peak value Q_p of the quadrature term Q;

wherein the processor calculates an operating point that comprises the modulation depth M and the demodulation phase offset β of the phase generated carrier through employment of the peak value I_p of the in-phase term I and the peak value Q_p of the quadrature term Q;

wherein the ~~a~~ processor component ~~that~~ employs ~~only four samples~~ the quadrature term Q and the in-phase term I to calculate the phase angle φ, wherein ~~all~~ the ~~four samples~~ quadrature term Q and the in-phase term I are based on the optical signal.

16. (currently amended) The apparatus of claim 15, wherein the phase generated carrier comprises a period T_{pgc}, wherein the processor component obtains the ~~four~~ plurality of samples from an output signal from the sensor array within a same instance of the period T_{pgc}.

17. (currently amended) The apparatus of claim 16, ~~wherein the processor component employs one or more of the four samples to calculate an in-phase term I;~~

~~wherein the processor component employs one or more of the four samples to calculate a quadrature term Q;~~

wherein the processor component employs the in-phase term I and the quadrature term Q to calculate the phase angle φ at the operating point.

18. (currently amended) The apparatus of claim ~~17~~ 16, ~~wherein the processor component calculates a peak value I_p of the in-phase term I;~~

~~wherein the processor component calculates a peak value Q_p of the quadrature term Q;~~

~~wherein the processor component employs the peak value I_p of the in-phase term I and the peak value Q_p of the quadrature term Q to calculate an operating point that comprises a modulation depth M and a demodulation phase offset β of the phase generated carrier~~

wherein the plurality of samples comprises four samples that are based on the optical signal;

wherein the processor component obtains the four samples from the output signal from the sensor array within the same instance of the period T_{pgc}.

19. (currently amended) The apparatus of claim ~~18~~ 16, wherein the ~~four~~ plurality of samples comprise samples S_0, S_1, S_2, and S_3;

wherein the processor component ~~calculate~~ calculates the in-phase term I:

$I = (S_0 + S_2) - (S_1 + S_3)$;

wherein the processor component ~~calculate~~ calculates the quadrature term Q:

$Q = -(S_0 - S_2)$;

wherein the processor component calculates the phase angle φ:

$\varphi = \text{arctangent} (Q / I)$.

20. (currently amended) The apparatus of claim 19, ~~wherein the processor component calculates the peak value I_p:~~

$$\cancel{I_p(M,\beta) = 2 \cdot B \cdot \left(\cos(M \cdot \sin\beta) - \cos\left(M \cdot \sin\left(\tfrac{\pi}{2} + \beta\right)\right)\right);}$$

wherein the processor component calculates the peak value Q_p:

$$Q_p(M,\beta) = 2 \cdot B \cdot \sin(M \cdot \sin\beta).$$

21. (original) The apparatus of claim 20, wherein the processor component employs the peak value I_p and the peak value Q_p to calculate the operating point that comprises a modulation depth approximately equal to 2.75 radians.

22. (original) The apparatus of claim 21, wherein the processor component employs the peak value I_p and the peak value Q_p to calculate the operating point that comprises a demodulation phase offset approximately equal to 0.5073 radians.

23. (currently amended) The apparatus of claim ~~18~~ 16, wherein the ~~only four~~ plurality of samples comprise samples S_0, S_1, S_2, and S_3;

wherein the processor component ~~calculate~~ calculates the in-phase term I:

$$I = (S_0 + S_2) - (S_1 + S_3);$$

wherein the processor component ~~calculate~~ calculates the quadrature term Q:

$$Q = -2 \cdot (S_0 - S_2);$$

wherein the processor component calculates the phase angle φ:

$$\varphi = \text{arctangent} (Q / I).$$

24. (currently amended) The apparatus of claim 23, ~~wherein the processor component calculates the peak value I_p:~~

$$\cancel{I_p(M,\beta) = 2 \cdot B \cdot \left(\cos(M \cdot \sin\beta) - \cos\left(M \cdot \sin\left(\pi/2 + \beta\right)\right)\right);}$$

wherein the processor component calculates the peak value Q_p:

$$Q_p(M,\beta) = 4 \cdot B \cdot \sin(M \cdot \sin\beta).$$

25. (original) The apparatus of claim 24, wherein the processor component employs the peak value I_p and the peak value Q_p to calculate the operating point that comprises a modulation depth approximately equal to 2.49 radians.

26. (original) The apparatus of claim 25 wherein the processor component employs the peak value I_p and the peak value Q_p to calculate the operating point that comprises a demodulation phase offset approximately equal to 0.3218 radians.

27. (currently amended) An article, a sensor array that employs a parameter to induce a time-varying phase angle φ on an optical signal that comprises a phase generated carrier, the article comprising:

one or more computer-readable signal-bearing media; ~~and~~

means in the one or more media for calculating a quadrature term Q through employment of one or more of the plurality of samples that are based on the optical signal;

means in the one or more media for calculating an in-phase term I through employment of one or more of a plurality of samples that are based on the optical signal;

means in the one or more media for calculating a peak value I_p of the in-phase term I as $I_p(M,\beta) = 2 \cdot B \cdot \left(\cos(M \cdot \sin\beta) - \cos\left(M \cdot \sin\left(\pi/2 + \beta\right)\right)\right)$, wherein M is a modulation depth and β is a demodulation phase offset of the phase generated carrier;

means in the one or more media for calculating a peak value Q_p of the quadrature term Q;

means in the one or more media for calculating an operating point that comprises the modulation depth M and the demodulation phase offset β of the phase generated carrier through employment of the peak value I_p of the in-phase term I and the peak value Q_p of the quadrature term Q; and

means in the one or more media for calculating the phase angle φ through employment of the quadrature term Q and the in-phase term I~~only four samples~~, wherein the ~~four samples~~ quadrature term Q and the in-phase term I are based on the optical signal.

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28. (currently amended) The article of claim 27, wherein the plurality of samples comprise samples S_0, S_1, S_2, and S_3, wherein the means in the one or more media for calculating the quadrature term Q through employment of the one or more of the plurality of samples that are based on the optical signal comprises ~~phase generated carrier comprises a period T_{pgc}; the article further comprising~~:

means in the one or more media for ~~sampling an output signal from the sensor array to obtain the four samples from a same instance of the period T_{pgc}~~ calculating the quadrature term Q:

$$Q = -(S_0 - S_2);$$

wherein the means in the one or more media for calculating the peak value Q_p of the quadrature term Q comprises:

means in the one or more media for calculating the peak value Q_p of the quadrature term Q:

$$Q_p(M, \beta) = 2 \cdot B \cdot \sin(M \cdot \sin \beta).$$

29. (currently amended) The article of claim 28, wherein the plurality of samples comprise samples S_0, S_1, S_2, and S_3, wherein the means in the one or more media for ~~calculating the phase angle φ through employment of the only four samples, the four samples based on the optical signal~~ calculating the quadrature term Q through employment of the one or more of the plurality of samples that are based on the optical signal comprises:

~~means in the one or more media for calculating an in phase term I through employment of one or more of the four samples;~~

means in the one or more media for calculating ~~a~~ the quadrature term Q: ~~through employment of one or more of the four samples; and~~

$Q = -2 * (S_0 - S_2);$

~~means in the one or more media for calculating the phase angle φ through employment of the in phase term I and the quadrature term Q~~

wherein the means in the one or more media for calculating the peak value Q_p of the quadrature term Q comprises:

means in the one or more media for calculating the peak value Q_p of the quadrature term Q:

$$Q_p(M, \beta) = 4 \cdot B \cdot \sin(M \cdot \sin \beta).$$

30. (currently amended) The article of claim ~~29~~ 27, ~~further comprising~~ wherein the means in the one or more media for calculating the phase angle φ through employment of the in-phase term I and the quadrature term Q comprises:

~~means in the one or more media for calculating a peak value I_p of the in-phase term I;~~

~~means in the one or more media for calculating a peak value Q_p of the quadrature term Q;~~ ~~and~~

~~means in the one or more media for calculating an operating point that comprises a modulation depth M and a demodulation phase offset β of the phase generated carrier through employment of the peak value I_p of the in-phase term I and the peak value Q_p of the quadrature term Q~~

means in the one or more media for calculating the phase angle φ = arctangent(Q / I) at the operating point.

31. (new) The method of claim 4, wherein the step of sampling the output signal from the sensor array to obtain the plurality of samples from the same instance of the period T_{pgc} comprises the step of:

sampling the output signal from the sensor array to obtain four samples from the same instance of the period T_{pgc}.

32. (new) The method of claim 8, wherein the step of sampling the output signal from the sensor array to obtain the plurality of samples from the same instance of the period T_{pgc} comprise the step of:

sampling the output signal from the sensor array to obtain four samples from the same instance of the period T_{pgc}.